

EXPLORING THE RELATIONSHIP BETWEEN LEARNING STYLE AND CRITICAL THINKING IN AN ONLINE COURSE

Simone Conceição

Abstract

As online courses become more widespread in adult education programs, adult educators begin to explore teaching strategies that effectively facilitate student learning based on different learning styles. One teaching strategy commonly used in online courses to develop adult learners' critical thinking skills is the discussion forum. Using online discussion forums in courses, often some students lack effective strategies for participating in discussion forums in courses. Therefore, this study explores the relationship between learning style and critical thinking in an online course that used discussion forums and concept maps as teaching strategies. Learning strategies used by students in the course were assessed using a Kolb-based learning style inventory. Students' critical thinking skills were assessed by asking them to create concept maps of the reading materials and discussions in the course. Findings of this study show that there was no relationship between learning style and critical thinking; however, it suggests that individual factors (learner's competency using concept map software, learner's motivation about topics discussed, and individual learning style) and group factors (combination of learning styles in a group and group facilitation) influenced the ability of students to demonstrate successful critical thinking skills in the course.

As online courses become more prevalent in adult education programs, adult educators explore teaching strategies that more effectively facilitate student learning based on different learning styles. A variety of teaching strategies for the online environment have been offered to practitioners in articles and books; however, few studies examine these teaching strategies based on student learning styles.

One teaching strategy that is commonly used in online courses is the discussion forum. In an online discussion forum, a group of learners engages in a computer-mediated interchange of ideas through e-mail, chat, or bulletin board technology. As in a face-to-face discussion, each message is seen by all members of the group, but the lack of direct personal contact presents certain challenges. In my experience with discussion forums in courses, I have observed that some students lack effective strategies for participating in this activity.

Therefore, as part of my Scholarship of Teaching and Learning (SoTL) research, I proposed to explore the relationship between learning style and critical thinking in an online course that uses discussion forums and concept maps as teaching strategies. My initial conjecture was that certain learning strategies would help learners be more successful in online discussion forums. To study this issue, I offered an Internet-based course using online discussion forums with the purpose of fostering learners' critical thinking skills. The learning strategies used by students in the course were assessed using a Kolb-based learning style indicator. Students' critical thinking skills were assessed by asking them to create concept maps of the reading materials and discussions in the course.

Internet-Based Course

The Internet-based course was offered in Fall 2003. Course content was divided into modules during which specific readings were assigned. Each module lasted two to three weeks. As part of the course assignments, learners were required to: (1) participate in online discussion forums for each module, (2) create concept maps of their understanding of the concepts addressed in the readings and online discussion forums upon completion of each module, (3) self-reflect on the concept maps immediately after they created them, and (4) participate in a group project to develop a program.

Online Discussions

The online discussions involved the posting of a minimum of five messages per module. Students were divided into two groups of four, and two group members were assigned the roles of facilitator and summarizer. All group members played the role of contributor. The facilitator was in charge of initiating the discussion with one or two questions from the readings. As group members responded to the facilitator's questions, the facilitator extended the discussion by posing new questions on issues that came out of the discussion. As part of the facilitation requirement, the facilitator was supposed to refer back to the readings to initiate discussion on another aspect of the topic. Facilitators were free to select discussion topics based on the readings, set an agenda for the length of the discussion period, and provide brief summaries during the discussion. The summarizer was responsible for providing a brief review of the main issues discussed during the module and any conclusions reached by the group at the end of each module. Contributors were required to respond to questions posted by facilitators and group members, as well as review and comment on the responses of others through the discussion board.

It was essential that each response posted by participants clearly tie back to the reading materials. Participants could post comments in a variety of different formats: introduce scholarly references from other sources to support or highlight their perspectives, discuss personal experiences, or share professional experiences related to the module topic, but each response had to refer back to a point or points in the reading materials. Part of the discussion requirement was that participants had to make their arguments, describe experiences, or discuss alternative perspectives within the context of the reading materials.

Participants' critical thinking skills were graded by demonstrating evidence of dynamic reorganization of knowledge in meaningful and usable ways. A critical thinking rubric that included analysis, evaluation, and connection of information was used. To comply with the analysis criterion, participants needed to identify main ideas in readings, differentiate core ideas from supporting information, and use detail and language to demonstrate an understanding of the major concepts. To meet the evaluation criterion, participants had to assess information for its reliability and usefulness, discriminate between relevant and irrelevant information, determine how information could be applied in real life, and recognize fallacies and errors in reasoning (vagueness, untruths, etc.). Finally, for the connection criterion, participants had to compare or contrast similarities and differences between concepts, infer unknown generalizations or principles from information or observations, use generalizations and principles to infer unstated conclusions about specific information or situations, and identify causal relationships between events or objects. The set of criteria presented to students were guidelines for grading the

discussion. Participants did not have to comply with each element of the criterion, depending on how the group discussion developed.

Concept Maps

Concept maps were employed as a teaching and evaluation tool in this study. As a teaching tool, students used concept maps to gain a set of skills to process and generate information and beliefs. As an evaluation tool, students self-assessed their own thinking processes and critical thinking skills. Upon completion of each module, students created concept maps that demonstrated their understanding of the theories and concepts in the readings and online discussion forums. Also, at the end of the semester students created a concept map of their synthesis of the concepts addressed in the whole course.

Concept maps were graded based on the following criteria (Novak and Gowin, 1984, p. 36):

- Proposition: Is the meaning relationship between two concepts indicated by the connecting line and linking word(s)? Is the relationship valid?
- Hierarchy: Does the map show hierarchy? Is each subordinate concept more specific and less general than the concept drawn above it (in the context of the material being mapped)?
- Cross links: Does the map show meaningful connections between one segment of the concept hierarchy and another segment? Is the relationship shown significant and valid?

Upon completion of each concept map, students were asked to respond to the following questions:

- After creating the concept map, did you see relationships among concepts that you did not see before?
- What was the easiest relationship among concepts to depict? What were the most difficult relationships to depict? Why were they easy or hard to depict?
- Look at the concept map and think back to the online discussion you participated in during this module. Is there a relationship between the concepts you read and the online discussion? Were there moments in the online discussion when you felt disoriented or confused? Does the concept map provide any clues about why you felt this way?

Development of a Program

For this activity students were divided into two groups (group A and B). Students decided to maintain the same group they were working with in the online discussion forum. Based on the course readings, resources from the Internet, and personal experience, students worked collaboratively online throughout the semester to design an educational program. Students had to complete six tasks in order to meet the assignment requirements. These tasks were due every two weeks. Even though this activity was not aimed at measuring students' critical thinking skills, it was an important course component because it showed how students with different learning styles worked together as a group to accomplish the tasks.

Methodology

The purpose of this investigation was to analyze the relationship between learning style and critical thinking in an online course that used discussions forums and concept maps as teaching strategies. Data were collected using quantitative and qualitative methods: (a) a learning style indicator adapted from Kolb's (1984) experiential learning style, (b) concept maps, (c) self-reflections, and (d) records of participants' online discussions. Eight learners enrolled in an online course in Fall 2003 participated in this study.

Research Questions

The study was based on the following research questions: Which learning styles are most likely to be successful in courses that use online discussion forums? Which students (based on learning style) are most likely to succeed in online discussion forums?

Data Analysis

Data from online discussion forums, a learning style inventory, concept maps, and concept map reflections were analyzed for the relationship between learning styles and learners' ability to demonstrate critical thinking in an online discussion forum. Records from online discussion forums were examined to verify if students demonstrated evidence of dynamic reorganization of knowledge in meaningful and usable ways. The learning style inventory was used to place learners in the following categories: Thinkers, Doers, Feelers, and Watchers. Concept maps were quantitatively scored based on Novak and Gowin's (1984) scoring model. The scores of students in each group were analyzed statistically to identify interesting patterns of achievement in the course. The records of the self-reflections were examined qualitatively in order to gain additional insights into the relationship between learning style and ability to demonstrate critical thinking in online discussion forums.

Findings

The learning style inventory categorized learners as Thinker (N=1), Doers (N=6), and Watcher (N=1). Group A was formed with four Doers; Group B was formed with two Doers, one Watcher, and one Thinker. The scores seen among students in each group were analyzed statistically to identify patterns of achievement in the course (Table 1 shows concept map scores). The first number in parentheses corresponds to the proposition score, the second number corresponds to the hierarchy score, and third number corresponds to the cross links score. The number in bold is the total of the three scores.

Based on the analysis of the concept map quantitative scores, there is no relationship between learning style and critical thinking. Concept map scores were not constant based on students of a specific learning style. The scores also varied from module to module. When analyzing qualitative data, it suggests that individual and group factors influenced the ability for students to demonstrate successful critical thinking in online discussion forums.

Individual Factors

Individual factors included (1) learner's competency using concept map software, (2) learner's motivation about topics discussed in the group online discussions, and (3) individual learning style. Learners who did not know how to use the concept map software constructed a very basic graphic representation of the relationship among concepts in the readings and online discussions. Concept maps flowed naturally when the subject included relationships that were easy to break down into manageable topics, or when topics were taken from personal experience. Learners stated that these topics were easier and more interesting in online discussions. Difficult relationships among concepts to depict were: understanding the theories and breaking them down, interrelating a chapter with other chapters, and working with topics that were the least interesting. Individual learning styles affected how learners participated in the discussion. "Doers" were more inclined to provide examples from concrete experience and active experimentation and did not provide an in-depth analysis of topics during the online discussions. The "Thinker" tended to provide in-depth reflection of topics during the online discussions, but felt overwhelmed and confused at times. The "Thinker" stated that the completed concept map helped diminish confusion, the concept map provided big clues for the confusion when discussing theories during the online discussions. The "Watcher" provided a mix of reflective observation and concrete experience - a nice balance during the discussion and creation of concept maps.

Group Factors

Group factors consisted of (1) a combination of students' learning styles in a group, and (2) group facilitation. In this study, students were divided into two groups. One group was formed with "Doers" and the other group had a mix of learning styles. The group of "Doers" based most of the online discussions on concrete experiences and active experimentation. For the group project, the "Doers" were on task by setting timelines and dividing roles; however, for the online discussions they addressed the issues only briefly and lacked in-depth critical analysis of topics. The other group had two "Doers," a "Watcher," and a "Thinker." The online discussions involved reflection and analysis of concepts based on concrete experience and reflective observation. However, for the group project it was only after several weeks of discussion that they figured out what the group assignment was and how to accomplish it. Another factor that influenced effective critical thinking in online discussion was group facilitation. For each module, one participant was the facilitator. If this student did not involve group members in the online discussions or did not provide enough questions in a timely manner, some students felt disappointed. But when the facilitator provided good directions to the group, it became easier for participants to create a framework for building their own concept maps.

Student (Group)	CMap 1	CMap 2	CMap 3	CMap 4	CMap 5	Final CMap
Doer1 (A)	(16+10+0) 26	(26+35+40) 101	(32+10+80) 122	(21+10+60) 91	(26+15+10) 51	(51+15+100) 166
Doer2 (A)	(56+20+30) 106	(64+25+70) 139	(75+15+50) 140	(60+30+50) 140	(53+20+130) 203	(70+20+130) 220
Doer3 (A)	(88+20+250) 77	(116+15+17) 0)	(17+20+40) 358	(71+15+70) 156	(29+10+40) 79	(42+25+90) 157
		311				

Student (Group)	CMap 1	CMap 2	CMap 3	CMap 4	CMap 5	Final CMap
Doer4 (A)	(74+15+170) 259	(88+25+410) 523	(55+35+90) 180	(42+20+80) 142	(64+20+110) 194	(105+25+280) 410
Doer5 (B)	(67+15+90) 172	(73+15+130) 218	(75+10+110) 195	(113+20+90) 223	(66+15+70) 151	(123+15+130) 288
Thinker (B)	(87+15+300) 392	(68+10+40) 118	(66+20+140) 226	(70+20+100) 190	(45+25+40) 105	(78+20+220) 318
Watcher (B)	(43+20+170) 233	(56+20+190) 266	(46+15+80) 141	(51+15+90) 156	(68+20+340) 428	(113+20+220) 353
Doer6 (B)	(31+20+80) 131	(49+15+70) 134	(35+20+60) 105	(42+15+120) 177	(23+15+80) 118	(44+30+200) 274
Average	174.5	226.5	183.75	159.38	166.13	273.25

Table 1: Concept Map Scores

Implications for Practice

These findings suggest that understanding how learning styles affect adult learners' success in online discussion forums can assist instructors in providing better instruction to learners when designing online courses. At the start of a course, learners can be told which learning strategies are most effective when participating in online discussion forums. This can be particularly helpful for adult learners whose personal learning style does not emphasize those strategies. This study offers a valuable lesson by demonstrating that a variety of learning styles in a group can make the learning experience more balanced. Thus, instructors should consider combining students with different learning styles when setting up groups in the beginning of a course. One drawback of this study was that the sample was too small, but it was contingent on the number of students enrolled in the course. The study will be repeated in Fall 2004.

References

- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs: Prentice Hall.
- Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. New York: Cambridge University Press.

Simone Conceição, Assistant Professor, University of Wisconsin-Milwaukee, e-mail: simonec@uwm.edu.

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